



# Simple Network Management Protocol (SNMP)

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# Introduction

**The Internet is:**

- a world-wide network of networks**
- with gateways linking organizations in North and South America, and Europe**

**The networks all use a common suite of networking protocols, Transmission Control Protocol/Internet Protocol (TCP/IP).**

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## **Introduction (cont'd)**

**As MU-SPIN schools' networks grow in scale, two facts will become painfully evident:**

- **The network and its associated resources become indispensable to the organization; and**
- **Many things can go wrong, thereby disabling the network or a portion of it, or degrading performance to an unacceptable level.**

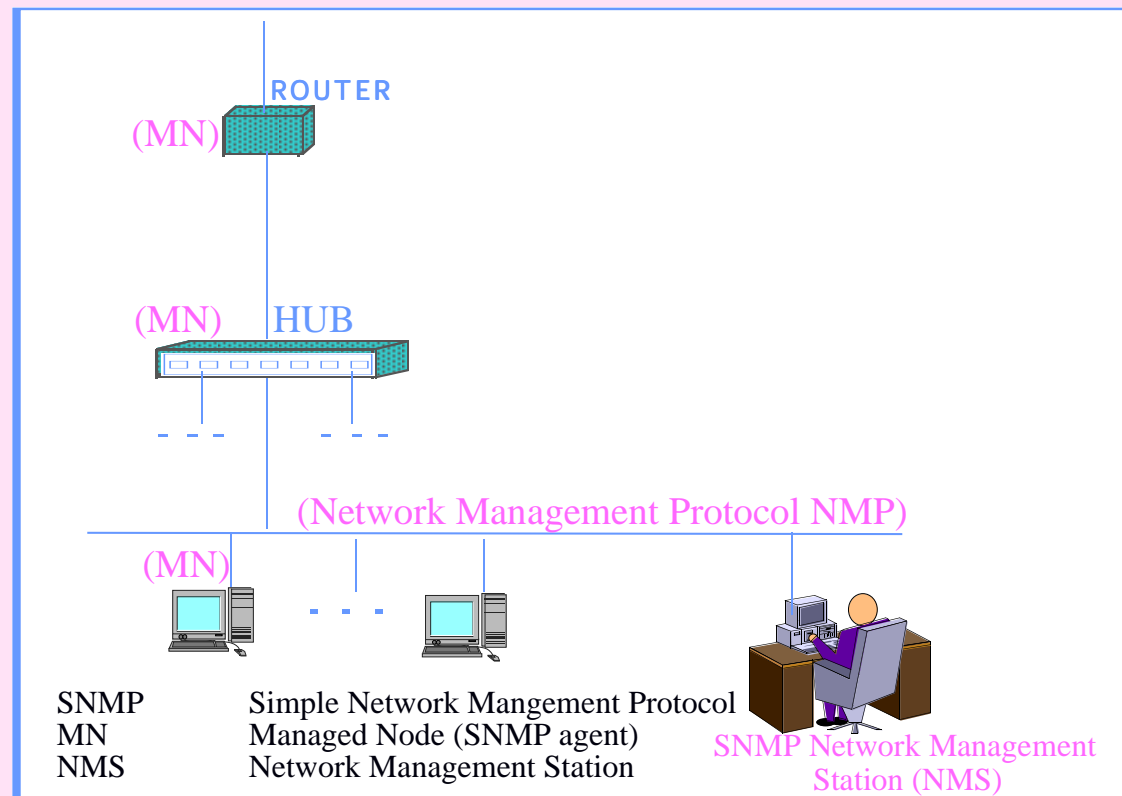
**SNMP is a key Internet Standard**

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# NETWORK MANAGEMENT MODEL



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## **NETWORK MANAGEMENT MODEL (cont'd)**

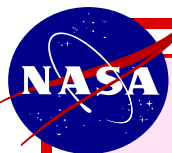


**The agent is responsible for the following duties:**

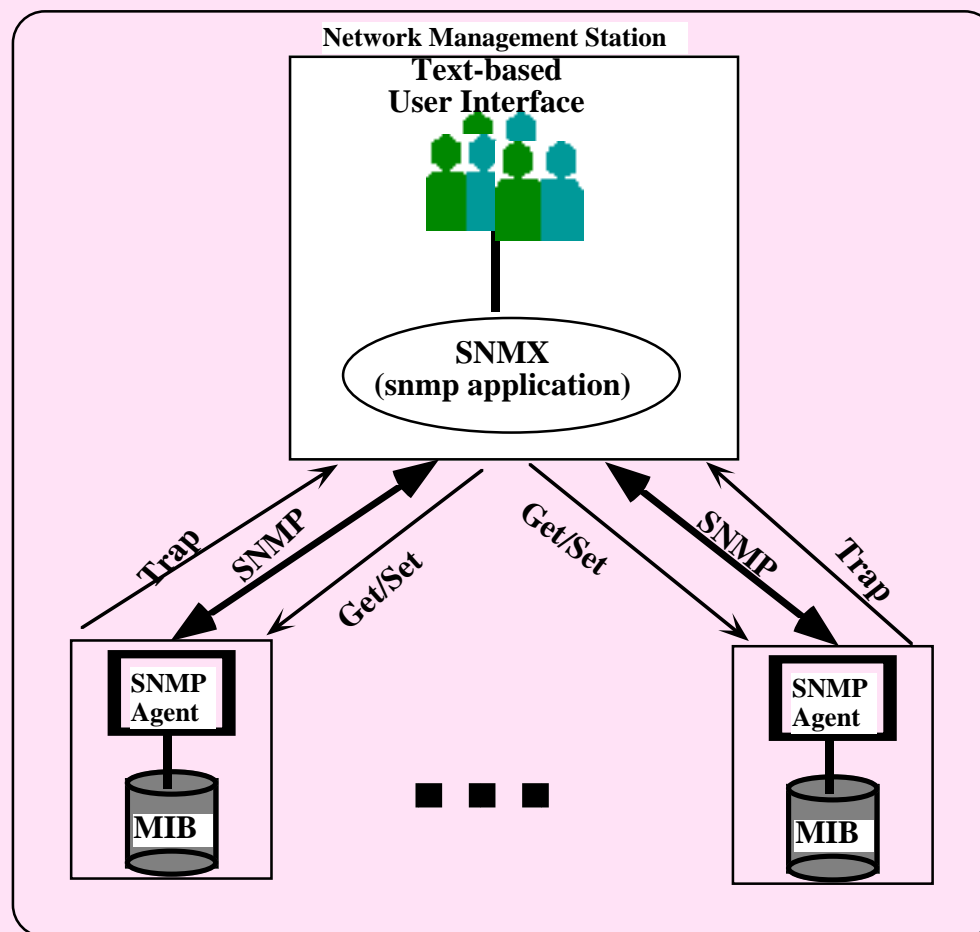
- collecting and maintaining information about itself and its local environment;**
- responding to manager commands to alter the local configuration or operating parameters.**

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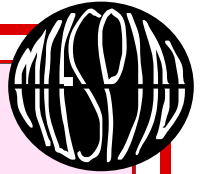


# SNMP ARCHITECTURE



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## **SNMP ARCHITECTURE (cont'd)**

**MIB-I was designed to include the minimal number of managed objects.**

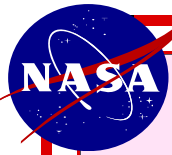
**For an object to be included, it had to meet these criteria:**

- **-object must be essential for either fault or configuration analysis.**
- **-control objects must have limited properties.**

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## **SNMP ARCHITECTURE (cont'd)**

- **-the object must have evidenced utility.**
- **-to make MIB-I attractive to vendors, a limit was set to ~ 100 objects.**
- **-the object must not be easily derivable from other objects.**
- **-the object must be sufficiently general in nature .**

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## **SNMP ARCHITECTURE (cont'd)**

**MIB-I evolved into MIB-II.**

**MIB-II was to maintain compatibility with MIB-I, with three areas to be addressed:**

- **incremental additions to reflect new operational requirements;**
- **improved support for multi-protocol devices; and,**
- **textual clean-up to improve clarity.**
- **MIB-II's managed object count grew to ~ 171; most vendors now implement MIB-II.**

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## **SNMP ARCHITECTURE (cont'd)**



**SNMP messages contain two parts:**

- **a community name, along with authentication information and,**
- **data, containing an SNMP operation and associated operands.**

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## SNMP FUNCTIONS

- **Get**, which is used by a manager to retrieve an item from an agent's MIB;
- **Set**, which is used by a manager to set a value in an agent's MIB; and
- **Trap**, which is used by an agent to send an alert to a manager.

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## SNMP Generic Command Structure

- **function gateway-name community-name object-identifier  
[object-identifier ..]**

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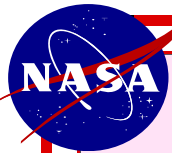


## SNMP Variables

- **sysDescr** - A textual description of the entity, including hardware and software version.
- **sysUpTime** - The time since the network management portion of the system was last re-initialized.

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## SNMP Variables Cont'd

- a command similar to:
- `get rtr-magic public sysDescr sysUpTime`
- yields results similar to:

» Name: `system.sysDescr.0`

- OCTET STRING- (ascii): GS Software (GS3-K0, Version 9.1(4) [fc1], SOFTWARE Copyright (c) 1986-1993 by Cisco Systems, Inc. Compiled Thu 25-Mar-93 09:49

- Name: `system.sysUpTime.0`

- Timeticks: (33029963) 3 days, 19:44:59

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## **NETWORK MANAGEMENT GOALS AND SNMP**



- 1. People in the organization depend on the system being reliable; and**
- 2. LANs, routers, lines, and other communications resources have costs.**

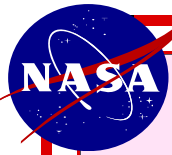
**The ultimate goal to provide:**

- a consistent, predictable, acceptable level of service from the available network resources.**

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## **SYSTEM MONITORING Example**

**Execute the following command every hour:**

- **get rtr-magic public ifInUcastPkts ifInNUcastPkts**

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## **SYSTEM MONITORING Example (cont'd)**

**Execute the following command every hour;**

- **get rtr-magic public ifInErrors ifOutErrors**
- **plot output.**

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## **Fault Detection**

- **develop source/destination matrix**
- **query MIB variables**

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## **Configuration Management**

**Is the setting, collecting and storing of :**

- the state and parameters of network resources.**

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## **Performance and Cost**

**The goal is to:**

- **measure system and component utilization**
- **locate bottlenecks.**

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## Products



- **Commercial and Non-commercial products**

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## Commercial Product



- GUI with visual layout of network
- public domain Vs Commercial products

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## Conclusion and Recommendations

- *SNMX is currently available for the following platforms:*
- *SunOS*
- *Sun Solaris*
- *Linux*
- *Silicon Graphics, Inc.*
- *IBM AIX*
- *SCO Release 3*
- *BSDI BSD/OS*
- *DECStation Ultrix*
- *Harris Night Hawk*
- *HP Apollo*
- *HP 9000 HP-UX*
- *MIPS*

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